

III. *The Larva of Euliphyra mirifica*. By HARRY ELTRINGHAM, D.Sc., M.A.

## PLATE XXVIII.

Two spirit specimens of this remarkable Lycaenid larva, together with several larval and pupal skins have been kindly handed over to me by Prof. Poulton for examination.

I have endeavoured to illustrate the larva and some of its special features on Plate XXVIII, though I have found the correct delineation of its shape and markings peculiarly difficult, and the figures are scarcely so satisfactory as I could wish.

The specimens are about 20 mm. in length, and the dorsal and lateral views present an appearance recalling that of a mollusc rather than of a lepidopterous larva. The ground-colour is brownish ochreous, and there are several irregular markings of a rich umber brown. The general appearance from a dorsal view may be gathered from fig. 1. The lateral portion of the larval skin is extended and modified into a kind of mantle, the edge of which touches whatever the larva may be resting upon. From the edge of the mantle, the sides, which present an irregular and wavy surface, slope up to the dorsal area, along the whole length of which is a deep groove bounded on each side by a hard chitinous ridge, the latter, except at the extremities, being thrown into a series of deep curving folds. This dorsal groove curves down to the mantle edge rather abruptly at the hinder end but more gradually at the anterior extremity. Round the edge of the mantle are twenty-four dark brown spots, many of which are extended towards the dorsal region as irregular marks, and between these markings there are sometimes smaller spots of the same colour. On each side there are nine spiracles. The first lies just above the second dark spot of the mantle edge, the second is above the fourth spot, and the remainder correspond in position to the mantle spots beneath them. The third is placed very far up the side, the fourth a little lower, and the remainder still lower and in a nearly straight line.

The whole structure of the exposed portion of this remarkable larva is profoundly modified, presumably as

a protection against the attacks of the ants by which in life it is surrounded. The entire skin is covered with thick chitinous plates which are irregularly radiate, and have sloping edges. The projections of these plates interlock with the lateral cavities of those adjacent, and the appearance under a high power is not unlike that of a complicated armour sheet of cog-wheels. Such an arrangement doubtless provides a very efficient protective covering with a maximum of flexibility. One of these plates is shown highly magnified at fig. 7, but they vary considerably in size and in the extent to which the edges are sloped. Further microscopic examination shows that the brown markings on the larva are caused by the presence of small brush-like chitinous tufts, fig. 8, one of which arises from the socket in the centre of each chitinous plate. In the unpigmented parts of the skin, from which these tufts are absent, the plates still have the sockets, so that at one period of its evolution the larva probably had the tufts or at least some scale-like growth on every plate. Here and there in the armour, especially (probably exclusively)\* on the pigmented areas, there are small round openings, the edges of the adjacent chitinous plates being neatly hollowed so that each forms its respective part of the circle. Possibly these apertures are the external openings of glands, though I have as yet no proof of this. If, as I think, they are confined to the pigmented areas, this would probably account for the correlated presence of the brush-like tufts, which may either protect the openings, or, as Prof. Poulton has suggested, hold some attractive secretion prized by the ants.

Fig. 5 shows a portion of the margin of the mantle. The extreme outer edge is armed with a regular fringe of flat chitinous projections, their bases furnished with interlocking processes. On the upper side of each projection there is a thin scale, very narrow at its socket but increasing outwardly to about the same width as the projection on which it lies. The purpose of these scales is not very obvious, but possibly they may have a tactile function. Within the peripheral fringe so formed there is a row of thick elongated chitinous plates, the edges of

\* The openings described can be seen only in a carefully made microscopic preparation, and proof that they occur on the pigmented areas alone could only be obtained by making preparations of the skin of the entire larva.

which are provided with somewhat irregular interlocking processes. One of these plates is shown highly magnified at fig. 6. Each has a scale-socket, but, apparently, does not bear either a scale or a brush-like tuft.

Fig. 9 shows one of the spiracles. Most, if not all, of these have the openings represented on the plate, although it is sometimes difficult to be sure of the presence of all three. Protection is afforded by stiff pointed hairs, for the most part curving inwards towards or over the spiracular orifices. Finally, the hard chitinous ridges of the dorsal groove are armed with very short hook-like spines and there are a few spines or hairs on the underside of the mantle edge, so arranged as to preclude entry if the mantle were raised at any part.

On turning the larva over its lepidopterous character becomes more evident (see fig. 3). The head, three pairs of true legs, and five pairs of prolegs can now be seen. The true legs seem to be progressively slightly larger as we proceed backwards, whilst the last pair of prolegs are much smaller than the remainder. The prolegs are of what Dr. Chapman has described as the "Macro" type, having hooks only on the inner margins of the feet.

The head calls for special remark, owing to its modification in adaptation to the habits of the species. It is elongated and somewhat conical in form, and when withdrawn there is round the base a deeply invaginated fold of the cuticle. At fig. 10, I have prepared a semidiagrammatic illustration of the anterior portion viewed from beneath, to show the mouth parts, etc., though it must be understood that in the actual specimen the parts are all very small and close together, and cannot be distinguished so easily. There are six ocelli situate at *o*, four of which are anterior and lie in a small semicircle, the remaining two being rather more posteriorly placed. The antennae, *a*, are placed laterally just above the labrum, *l*, and beneath the latter, and in a dorsal view concealed by it, are the mandibles, *md*. These have four ridge-like teeth. The maxillae, *m*, have two large lobes each with two small points, and in the actual specimen lie close together, forming what looks like a pointed organ projecting from beneath the labrum, when viewed from above. There are large maxillary palpi, *mp*, and the labium, *lb*, is long and somewhat pointed, and has on it a small papilla, possibly a tactile organ. There is some evidence of a

second and smaller papilla not shown in the drawing. As already stated the mouth parts are exceedingly small and difficult to make out distinctly.

At fig. 4, I have shown the larval and pupal skins as seen after the emergence of the butterfly. The pupa is attached in a peculiar way to a leaf, its sucker-like extremity being spread out and apparently cemented down. It will be noted that the larval skin is not completely shed, but has been split open on the exposure of the pupa, afterwards remaining in this expanded condition. Viewed from the other side the empty shells of head, feet, etc., are easily seen.

This interesting larva resembles in some respects that of the Australian *Liphyra brassolis* described by Dr. Chapman.\* Both the specimens of *E. mirifica* sent by Mr. Lamborn are about the same size, so that I am unable to compare two stages of its growth, but evidently in *L. brassolis* the form in an earlier stage differs from that at a later period. Through the kindness of my friend Mr. G. T. Bethune-Baker, I have had an opportunity of examining larvae of this species. The cuticle is not provided with interlocking plates, but is covered all over with chitinous tubercles, and at the edges of the mantle is provided with numerous short setae. There is no dorsal groove and the cuticle is not thrown into ridges. As Dr. Chapman has stated, the spiracles are "minute holes without marginal structure." I have not been able to examine the mouth-parts, but they are evidently larger than in *Euliphyra*. The antennae are certainly longer and more conspicuous, and the jaws are more adapted for piercing and tearing. Dr. Chapman describes a peculiar modification of the prolegs which is not evident in *Euliphyra*.

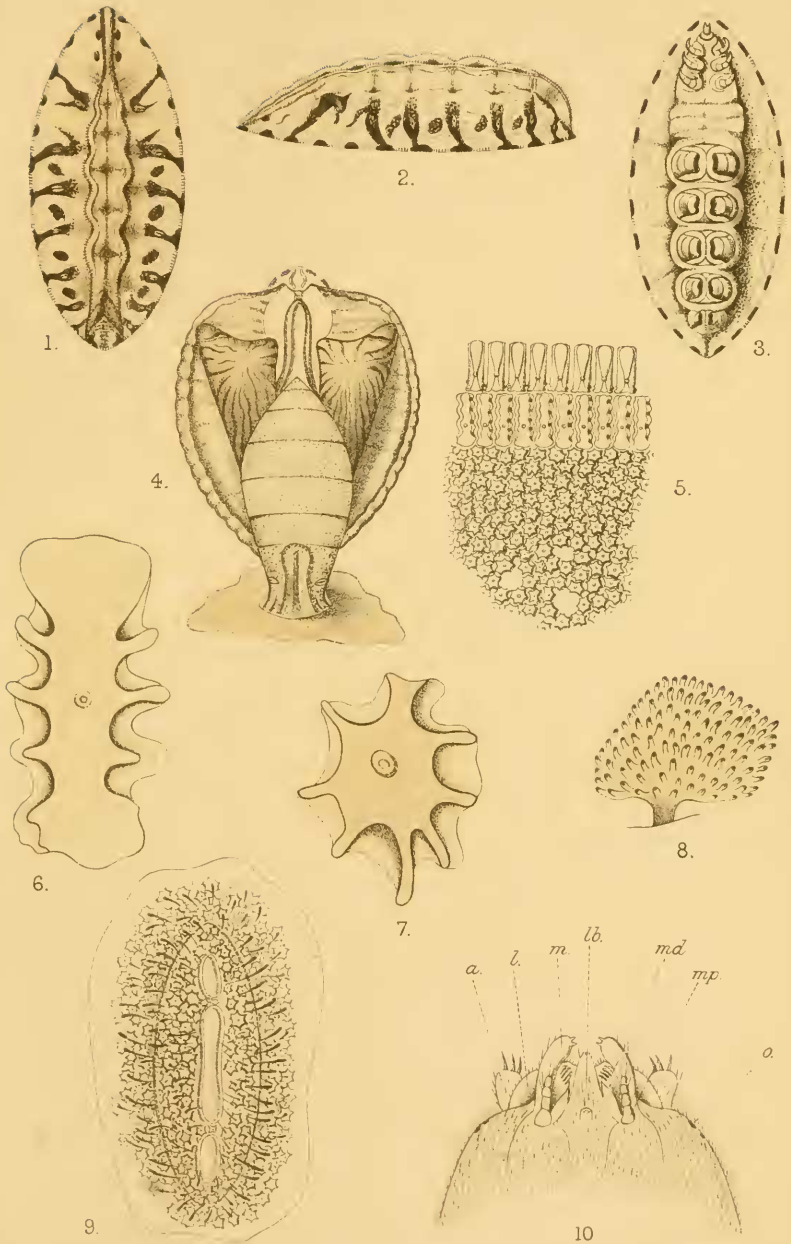
A further interesting point of comparison is that whilst in *E. mirifica* the pupa is formed half out of the larval skin, in *L. brassolis* it remains inside the larval cuticle, the latter forming a puparium like that of many Diptera.

\* *Entomologist*, p. 225, 1902. I am indebted to Commander J. J. Walker for this reference.

## EXPLANATION OF PLATE XXVIII.

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- FIG. 1. Larva of *Euliphyra mirifica* as seen from above.  $\times 2\frac{1}{4}$ .
2. Ditto, as seen from side.  $\times 2\frac{1}{4}$ .
3. Ditto, as seen from below.  $\times 2\frac{1}{4}$ .
4. View of larval and pupal skins as they appear after emergence of imago. Note peculiar sucker-like attachment of pupa to its support, and the split larval skin remaining *in situ*.  $\times 2\frac{1}{4}$ .
5. Portion of "mantle" edge of larva showing arrangement of chitinous plates, etc.  $\times 33$ .
6. One of the chitinous plates of the second row of the mantle edge.  $\times 230$ .
7. One of the chitinous plates which cover the general dorsal surface.  $\times 650$ .
8. One of the chitinous tufts which are attached to the pigmented portions of mantle.  $\times 650$ .
9. A spiracle.  $\times 50$ .
10. Semidiagrammatic view of extremity of head, arranged to show mouth parts; viewed from below.  $\times 50$ .
- (a) Antenna.
  - (l) Labrum.
  - (m) Maxilla.
  - (lb) Labium.
  - (md) Mandible.
  - (mp) Maxillary palp.
  - (o) Position of ocelli (these are not visible from a ventral view).



H. Eltringham del

West, Newman lith.

LARVA OF EULIPHYRA MIRIFICA.